SUMMARY

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for
RHIC Spin Collaboration Meeting XII
RIKEN BNL Research Center

Since its inception, the RHIC Spin Collaboration (RSC) has held semi-regular meetings each year to discuss the physics possibilities and the operational details of the program. Having collected our first data sample of polarized proton-proton collisions in Run02 of RHIC, we are now in the process of examining the performance of both the accelerator and the experiments. During the PAC meeting on August 29, 2002, the beam use proposal with a four week, polarized proton physics run was approved as part of the plan for Run-03. So, we meet at BNL on September 16, 2002 to discuss the concrete plans for this proton-proton run.

To open the meeting, Thomas Roser presented the machine plans for Run-03. The run will begin with deuteron-gold beams. During this time, work will be done between fills to understand and improve upon the polarization of the protons in the AGS. It is hoped that, with the addition of the new CNI polarimeter in the AGS, improved tune feed-back in RHIC, and the use of the Siemens instead of Westinghouse power supply in the AGS, that it will be possible to achieve a polarization of 50%, maybe a bit more. The luminosity for proton-proton collisions at the interaction regions should be an order of magnitude larger than it was last year because the number of bunches will be doubled, the focussing at the IPs reduced to $\beta^* = 1$ m, losses of ions during ramping should be reduced with the tune-lock (PLL) system operating, and finally the storage rf should reduce the vertex region to $\sim \pm 40$ cm. Later, Leif Ahrens presented a timeline for the startup of the machine. Specifically, in October, the AGS should see the first beam, probably deuterons and gold. In early November, the cool-down of RHIC should start so that RHIC is ready for beam in the first week of December. Most of the month of December will be spent tuning up RHIC for deuteron-gold collisions. Once that has been accomplished, the dA physics program will commence and the polarization commissioning work for the AGS will be underway. By this time, it is hoped that the new CNI polarimeter will have been commissioned using deuterons.

Between Leif's and Thomas's talk, Anatoli gave an update on the status of the polarized proton source. Proceeding to tackle the molecular component problem[1], he reports that he now sees proton polarization of $> 80\%$ in both the Lamb shift polarimeter and the 200 MeV polarimeter – it should be noted that this is an increase from $\sim 70\%$ during Run-02 – with $\sim 5 \times 10^{11}$ ions per pulse.

To close out the morning session, Jeff Wood gave an update on the progress of the new CNI polarimeter. At this time, the main technical concern is noise pickup from the passing bunches in the AGS. Tests have been done by running a pulse of appropriate shape and magnitude down a wire which was placed down the center of the polarimeter pipe and the measuring the pick-up on the silicon detectors. In this arrangement, they saw ~ 60 mV (peak-to-peak) noise. This noise was reduced to ~ 10 mV by shielding the preamplier box. Thoughts are now focusing on how to do a noise subtraction. Presently, they are planning to install the device in the AGS by mid-October and this work seems to be on schedule. After installation, there is then a significant amount of commissioning work which needs to done. There is some hope that this work can be done when deuterium beams are in the AGS starting in early December.

To open the afternoon session, we discussed the feasibility of frequently recogging the beams during a fill. This recogging will reduce the systematic error in the relative luminosity by averaging out bunch-to-bunch differences which are not understood. To start this discussion, Mike Brennan informed us that the recogging was technically possible as long as the common

[1] For a detailed discussion of this matter, see Anatoli's take in April, 2002 proceedings.

rf was not operating. Further, it is expected that the common rf is not needed to squeeze the longitudinal size of bunches. Wolfram Fischer then talked about the effects, perhaps adverse, of such recogging on the beam. To begin with, he told us that, when the beams are recogged, the tunes change. So, we will need to define acceptable operating ranges so that the beam is not lost. How this effects the polarization would also need to be considered. Second, the recogging might increase the longitudinal and transverse emittance of the beam, resulting in a loss of luminosity at the experiments. Of particular concern with respect to polarization issues, there is an increased likelihood for debunching some of the beam. And, finally, we can expect that recogging will impact the lifetime. So, we decided that, for the time being, recogging would be investigated during commissioning but not used during the physics run.

Takehiro Kawabata talked about the present results of the relative luminosity analysis for PHENIX. At PHENIX, there are several luminosity detectors and thus we can compare the response of one against the others to evaluate each of their performance as a monitor for the relative luminosity. First, he showed that, within a fill, all of the detectors indicated that the specific luminosity varied from bunch to bunch by about 2 to 5%. Then, he looked at the ratios of relative luminosity measurement for the different detectors. By randomizing the polarization assignment for the bunches, he determined that the spread in the relative luminosity between different detectors had an error which, in a good fill, was $\sim 0.3\%$ larger than it would be if the fluctuations in the luminosity measurements were only statistical in nature. In other fills, it was seen that this systematic error could be significantly worse. By averaging the data from all of the fills, he reported that the systematic error of the relative luminosity measurement at PHENIX was $\sim 0.2\%$ in the Run-02 dataset. He then made some effort to identify the source of this non-statistical behavior by correlating the fluctations in the relative luminosity measurements to beam parameters. He then showed that there is perhaps a slight time-dependence within a fill. In addition, he found that there was a slight correlation between the non-statistical fluctuations and the width of the vertex distribution; the latter was determined from the width of the vertex distribution for ZDC trigger events since, in PHENIX, this is the only source of events for which there was no vertex cut applied by the trigger.

To finish the meeting, we had an open discussion of the experiment needs for Run-03.

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